ASTRONOMY AND ASTROPHYSICS

A European Journal

Volume 3 1969

Published by Springer-Verlag Berlin · Heidelberg · New York
on behalf of the Board of Directors

Astronomy and Astrophysics

A European Journal

Board of Directors

Chairman: A. Blaauw (ESO)
Vice Chairman: B. Strömgren (Denmark)
Secretary and Treasurer: Y. Mazières (France)

L. Biermann (Germany)
H. G. van Bueren (The Netherlands)
J. Delhaye (France)
Ch. Fehrenbach (France)
W. Fricke (Germany)
G. W. Funke (Sweden)
J. H. Oort (The Netherlands)
E. Schatzman (France)
A. Unsöld (Germany)
A. G. Velghe (Belgium)

Editors-in-Chief 1969-72

S. R. Pottasch
Kapteyn Astronomical Laboratory
Broerstraat 7,
Groningen (The Netherlands)

J. L. Steinberg
Observatoire de Meudon
92 Meudon (France)

Editing Secretaries

Mrs. M. Steinberg
Miss O. Hänni
Miss G. I. van der Wal

Board of Editors

W. Becker (Basel)
A. Behr (Hamburg)
E. J. Blum (Meudon)
E. M. Burbidge (La Jolla)
G. M. Clemence (New Haven)
Ph. Delache (Nice)
P. Felenbok (Meudon)
G. B. Field (Berkeley)
S. C. B. Gascoigne (Canberra)
M. Hénon (Nice)
G. H. Herbig (Lick Obs.)
G. Herzberg (Ottawa)
L. Houziaux (Mons)
H. C. van de Hulst (Leiden)
C. de Jager (Utrecht)
E. Jensen (Oslo)
F. D. Kahn (Manchester)
K. O. Kiepenheuer (Freiburg)
R. Kippenhahn (Göttingen)
H. van der Laan (Leiden)
P. Ledoux (Liège)
J. Lequeux (Meudon)
P. O. Lindblad (Stockholm)
R. Lüst (München)
R. Michard (Meudon)
M. G. J. Minnaert (Utrecht)
B. Morando (Paris)
B. E. J. Pagel (Hailsham)
J. C. Pecker (Meudon)
L. Plaut (Groningen)
F. Praderie (Meudon
S. I. Rasool (New York)
J. Rösch (Obs. Pic du Midi)
M. Ryle (Cambridge)
D. H. Sadler (Herstmonceux)
M. Schmidt (Pasadena)
F. G. Smith (Jodrell Bank)
P. Swings (Liège)
A. B. Underhill (Utrecht)
H. Van Regemorter (Meudon)
J. P. Wild (Sydney)
L. Woltjer (New York)

The exclusive copyright © for all languages and countries, including the right for photomechanical and other reproduction, is vested in European Southern Observatory (ESO)

The quotation of registered names, trademarks, etc. in this journal does *not* imply, even in the absence of a specific statement, that such names are exempt from laws and regulations protecting trademarks, etc. and therefore free for general use.

Springer Verlag · Berlin · Heidelberg · New York

Printed in Germany

Druck: Brühlsche Universitätsdruckerei, Gießen

Volume 3 1969

Contents

Editorial 381

Stars and Stellar Evolution

R. M. West: On the Calibration of $M_V(K)$ for Giants by Means of Trigonometric Parallaxes 1
J. P. Babuel-Peyrissac and G. Rouvillois: Radiative Transfer in Novae 31
R. Kippenhahn: Mass Exchange in a Massive Close Binary System 83
D. Reimers: Quantitative Analysis of the δ Scuti-Variable δ Delphini 94
J. C. Ribes: Observations of Planetary Nebulae at 11 cm and 6 cm Wavelengths 156
A. Peraiah: Gravity Darkening in the Components of Close Binary Systems 163
U. K. Gehlich: Differential Fine Analysis Sirius Versus Vega 169
Karen T. Johansen: The Radii of the Components of 31 Cyg 179
A. A. Joukoff: Role of the Creation e in the Stellar Nucleosynthesis 186
M. S. Bhatia, S. Bonazzola and G. Szamosi: Electric Field in Neutron Stars 206
J. Isserstedt: Photoelectric Studies of a Nearby Stellar Ring in Aquila 210
W. Deinzer and C. J. Hansen: Fast Evolution Towards the White Dwarfs 214
R. Albrecht, H. M. Maitzen and K. D. Rakos: The Sun as a Variable Star 236
H. Heintzmann: General Relativistic Neutron Star Models 243
A. Ardeberg: Continuum Energy Distribution of O5-G0 Stars in Terms of Spectral Gradients 257
H. Ruhm: Contribution Functions 277
G. A. Tammann: The Light-Elements of an Anonymous Cepheid and on its Probable Membership in the Galactic Cluster NGC 6649 308
Ch. Fehrenbach, E. Maurice and L. Prévot: Two Stars of the Large Magellanic Cloud Showing Emission Lines of Fe II and [Fe II] 323
E. Schatzman: Gravitational Separation of the Elements and Turbulent Transport 331
Anne P. Cowley and W. A. Hiltner: A Unique Emission Line Object 372
A. Feinstein and F. C. Muzzio: The Light Curve of 1 Carinae 388
A. Martini: On the Interpretation of S Doradus 443
A. F. J. Moffat: A Theoretical Investigation of Focal Stellar Images in the Photographic Emulsion and Application to Photographic Photometry 455

Galactic Structure, Stellar Dynamics, Interstellar Matter

R. Louise: A Study of Hα/[N II] Ratio Lines in the Helix Nebula 29
G. L. Verschuur: An Intermediate Velocity Cloud Showing a Velocity Bridge to Local Matter 77
G. Courtès, R. Louise and G. Monnet: A Study of Hα/[N II] Ratio in Diffuse Nebulae 222
R. P. Fenkart: A Comparison of the Star-Densities for Disc and Halo in the Direction to the Galactic Poles by Means of the Three-Colour-Photometry 228
R. Louise and G. Monnet: On the Fluctuations of Electron Temperature in H II regions 270
A. Kiral: The Stellar Group Ba 7 327
K. Rohlfs, U. Mebold and M. Grewing: Interstellar Electron Temperatures from Pulse Delay Measurements and Hydrogen Line Spectra 347
J. Meurers: Random Number Generators and Their Application to Astronomical Statistical Problems 354
J. A. de Freitas Pacheco: Thermal Instabilities in the Interstellar Gas 368
M. J. Rees and J. Silk: Cosmic Electrons and Diffuse Galactic X- and γ-Radiation 452

Galaxies, Cosmology

J. Bergeron: The Possibility of Existence of a Dense Intergalactic Plasma 42
G. Mathez: On the Forbidden Line Spectra of QSS 127
A. Lausberg: Coriolis Effects in the Einstein Universe 150
B. E. Laurent and L. Söderholm: Development of the Metagalaxy 197
L. Gouguenheim: Neutral Hydrogen Content of Small Galaxies 281
R. J. Allen: The Radio Spectrum of Virgo A from 1411.7 to 1423.8 MHz 316

A. Braccesi and L. Formiggini: On the Number-Magnitude Relation for the Quasi-Stellar Objects in the Field 13^h, $+36°$ 364
R. J. Allen: Intergalactic Hydrogen Along the Path to Virgo A 382
L. Weliachew: A Neutral Hydrogen Study of the Interacting Galaxies NGC 4631 and NGC 4656 402
H. Arp: Companion Galaxies on the Ends of Spiral Arms 418
Ch. Bertaud, B. Dumortier, P. Véron, G. Wlérick, G. Adam, J. Bigay, R. Garnier and M. Duruy: Optical and Radio Study of BL Lacertae 436
H. van der Laan and G. C. Perola: Aspects of Radio Galaxy Evolution 468

The Sun

J. E. Blamont and C. Malique: Near-Limb Solar Brightness Distribution at 1216 Å and 1300 Å 135

Physical Processes

A. Gervat and D. Rossignol-Guzzi: Monte-Carlo Study of Stark Fields in Dense Plasmas 5
D. Schlüter and S. K. Tsoi: Energy Levels in the Debye Field 147
M. C. Lortet and E. Roueff: Broadening of Hydrogen Lines in a Neutral Medium 462

Planetary System

J. K. Shultis and H. G. Kaper: Greenhouse Effect in a Finite Anisotropically Scattering Atmosphere 110

Celestial Mechanics and Astrometry

A. Challe and J. J. Laclaverie: Disturbing Function and Analytical Solution of the Problem of the Motion of a Satellite 15
P. Guillaume: Families of Symmetric Periodic Orbits of the Restricted Three Body Problem, when the Perturbing Mass is Small 57
A. Deprit and J. Henrard: On the Periodical Orbits Emanating from L_4 in the Resonance Case 1/4 88
M. Imbert: Orbital Elements of Spectroscopic Binary HD 222317 272

Research Notes

C. A. Rouse: Helium Abundance Determination from Solar-Model Photospheres 122
S. Débarbat, E. Koppe, P. Piazza, A. Postoiev and A. Rabanaque: Observations of Uranus. Danjon's Astrolabe Results 126
D. S. Evans: Climatic Factors and Telescope Output 247
J. Audretsch and H. Dehnen: Radio Sources Opposite Quasi-Stellar Objects and Einstein-Friedman's Cosmology 252
B. Mollerus: *B*-, *V*-Photometry of Nova HR Delphini, 1967 376
H. Wöhl: On the Magnetic Splitting of Molecular Lines in Sunspot Spectra 378
H. van der Laan: The Radio Spectra of 3C Sources 477
G. C. Perola: Secondary Electrons in Radio Sources 481
M. Jaschek, C. Jaschek and S. Malaroda: The Spectra of Some Be Stars 485

Errata

J. Schubart: The Minor Planet (1221) Amor 256
K. H. Böhm: Atmospheres and Extended Envelopes of Central Stars of Planetary Nebulae 256
J. H. Focas and A. Dollfus: Optical Characteristics and Thickness of Saturn's Rings Observed on the Ring Plane in 1966 380
H. Wöhl: On the Magnetic Splitting of Molecular Lines in Sunspot Spectra 487

Abstracts of articles which will be published in A. A. Suppl. 1 No. 1

M. Floquet: Observations of Ap and Am Stars 488
Ch. Bertaud: Spectral Classification of 112 A and F Stars, Including 89 Am Stars 488
J. H. Bigay and R. Garnier: *UBV* Photometry of Hot Stars in Selected Areas 40 and 49 488
U. Haug and K. Walter: *UBV* Measurements in Selected Areas 100 and 112 488
U. Haug: *UBV* Observations of Luminous Stars in Three Milky Way Fields (Cassiopeia, Camelopardalis and Gemini) 488
P. Couteau: New Double Stars (Series 4) Discovered at Nice with the 50-cm Refractor 488